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1 LISTING OF THE CLAIMS

2 CLAIMS

3 Having thus described our invention, what we claim as new and desire to secure by
4 Letters Patent is as follows:

5 1. (Currently amended) A method comprising diagnosing from a <u>data</u> repository at least one fault
6 in a system, said <u>data</u> repository represented as a directed graph having one or more undivided
7 directed subgraphs, the step of diagnosing comprising the steps of:
8     receiving a first description of said at least one fault;
9     employing said first description to identify a response from the said <u>data</u> repository;
10     if the response is a diagnosis stopping, otherwise identifying at least one subgraph
11     responsive to said first description;
12     using said at least one subgraph in determining said diagnosis, stopping if said
13     diagnosis results, otherwise forming a modified description based upon said at least one
14     subgraph; and
15     replacing said first description with said modified description and repeating the steps
16     of receiving, employing, identifying and using until said diagnosis results.

17 2. (Original) A method as recited in claim 1, wherein the first description is completely covered
18 by the diagnosis, the method further comprising implementing a solution based on the diagnosis.

19 3. (Original) A method as recited in claim 1, wherein the first description includes a set of
20 symptoms describing said at least one fault.

21 4. (Original) A method as recited in claim 3, wherein the modified description includes an
22 additional set of symptoms identified for probing by the subgraph.

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1   5. (Original) A method as recited in claim 1, wherein the first subgraph is identified by a method
2   employing an index mapping descriptions to initial subgraphs, the trivial index simply mapping
3   all descriptions to one subgraph.

4   6. (Currently amended)   A method as recited in claim 1, wherein said <u>data</u> repository is <u>a remote</u>
5   <u>data repository</u> and said undivided subgraphs are downloaded from said <u>data</u> repository to a local
6   agent performing the diagnosis as needed.

7   7. (Original) A method as recited in claim 1, wherein said system is a system taken from a group
8   of systems consisting of: a machine; a software program; a process; and any combination of
9   these.

10  8. (Currently amended) A method as recited in claim 1, having ~~a~~ <u>at least one</u> limitation taken
11  from a group of limitations consisting of:

12  wherein each said undivided subgraph is implemented as executable code:

13  wherein said executable code is written in an object-oriented programming language;

14  wherein said executable code is written in a programming language that supports late binding;

15  wherein said programming language supports late binding and on-demand downloading of
16  classes;

17  wherein said programming language that is object-oriented and supports late binding and
18  on-demand downloading of classes is Java;

19  wherein said local agent is a machine;

20  wherein said remote <u>data</u> repository is downloaded as needed onto a small computing device;

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1   wherein said remote data repository is hosted by a service provider supporting a plurality of

2   customers and having each customer download subgraphs as needed to perform diagnosis;

3   wherein at least one of said customers is a customer support center diagnosing faulty systems on

4   behalf of a plurality of its own customers;

5   wherein said customer is a field representative performing diagnosis of a failing system;

6   wherein said customer is a faulty system operating in a self-diagnostic mode; and

7   wherein said faulty system applies the solution identified by the fault diagnosis system in an

8   autonomic, self-healing mode; and

9   any combination of these limitations.

10  9. (Original) A method as recited in claim 1, wherein said diagnosing is done proactively to

11  prevent faults from occurring in the future and/or to train someone to use said system

12  successfully so that faults will not occur.

13  10. (Currently amended) A method as recited in claim 1, wherein said data repository enables an

14  on-demand fault diagnosis system with a service provider charging each customer for an amount

15  of resources consumed during any diagnosis session.

16  11. (Currently amended) An article of manufacture comprising a computer usable medium

17  having computer readable program code means embodied therein for causing diagnosis from a

18  data repository of at least one fault in a system, the computer readable program code means in

19  said article of manufacture comprising computer readable program code means for causing a

20  computer to effect the steps of claim 1.

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1  12. (Currently amended) A program storage device readable by machine, tangibly embodying a

2  program of instructions executable by the machine to perform method steps for diagnosing from

3  a <u>data</u> repository at least one fault in a system, said method steps comprising the steps of claim 1.


4  13. (Currently amended) An apparatus comprising means for diagnosing from a <u>data</u> repository

5  at least one fault in a system, said <u>data</u> repository represented as a directed graph having of one or ¸

6  more undivided directed subgraphs, the means for diagnosing comprising:

7          means for receiving a first description of said at least one fault;

8          means for employing said first description to identify a response from the said <u>data</u>

9  repository;

10          means for if the response is a diagnosis stopping, otherwise identifying at least one

11  subgraph responsive to said first description;

12          means for using said at least one subgraph in determining said diagnosis, stopping if

13  said diagnosis results, otherwise forming a modified description based upon said at least

14  one subgraph; and

15          means for replacing said first description with said modified description and repeating

16  the steps of receiving, employing, identifying and using until said diagnosis results.


17  14. (Currently amended) A computer program product comprising a computer usable medium    ⁚

18  having computer readable program code means embodied therein for causing diagnosis from a

19  <u>data</u> repository of at least one fault in a system, the computer readable program code means in

20  said computer program product comprising computer readable program code means for causing a ⎯ ⎯ ⎯⎯⎯⎯⎯

21  computer to effect the functions of claim 13.


22  15. (Currently amended) A method for diagnosing a fault, said method comprising:


23  commencing a diagnosis session;


24  initializing a current state, the current state being symptoms comprising an initial description of a

25  fault being diagnosed;


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1    identifying one graph from a <u>data</u> repository of graphs which, when taken together, encode

2    symptoms and diagnoses of a system, and assigning said one graph to be the current graph;

3    retrieving said current graph from the <u>data</u> repository;

4    assigning one node of the current graph to be the current node;

5    identifying the node type of the current node; and

6         if the current node is of type diagnosis, then returning the diagnosis associated with the

7         node as the diagnosis of the fault;

8         if the node type is not of type diagnosis then performing a particular node type operation,

9         and repeating the step of identifying the node type of the current node, until the node type

10        of the current node is of type diagnosis.

11   16. (Original)  A method as recited in claim 15, wherein the step of identifying one root graph

12   comprises employing indexing graphs by symptoms.

13   17. (Currently amended)  A method as recited in claim 15, wherein:

14   the <u>data</u> repository of directed graphs is a remote <u>data</u> repository, remote from a process running

15   the fault diagnosis session, said remote <u>data</u> repository comprising a complete set of directed

16   graphs which taken together encode the symptoms and diagnoses of the fault diagnosis system;

17   the step of identifying one graph incorporates logic to remotely ask the <u>data</u> repository to identify

18   one graph at a known or discoverable location; and

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1    the step of retrieving incorporates logic to retrieve remotely from said known or discoverable

2    location.

3    18. (Original)  An article of manufacture comprising a computer usable medium having

4    computer readable program code means embodied therein for causing diagnosis of a fault the

5    computer readable program code means in said article of manufacture comprising computer

6    readable program code means for causing a computer to effect the steps of claim 15.

7    19. (Original)  A program storage device readable by machine, tangibly embodying a program of

8    instructions executable by the machine to perform method steps for diagnosing a fault, said

9    method steps comprising the steps of claim 15.

10    20. (Currently amended)  A method as recited in claim 15, wherein said data repository enables

11    an on-demand fault diagnosis system with a service provider charging each customer for an

12    amount of resources consumed during any diagnosis session.

13    21. (Original)  A method as recited in claim 15, wherein:

14    if the current node is of type call-graph, then the step of performing a particular node type

15    operation includes setting the current graph to be a graph associated with the call-graph node, and

16    repeating the steps of retrieving and assigning;

17    if the current node is of type functional-branch, then the step of performing a particular node type

18    operation includes evaluating a function associated with the functional-branch node over the

19    current state of the diagnosis session, and assigning the value of the function to be the current

20    node;

21    if the current node is of type question, then the step of performing a particular node type

22    operation includes asking a question associated with the current node, collecting an answer to the

23    question, updating the current state with a pair having a form <question, answer>, traversing an

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1    edge labeled by the answer or by a function that accepts the value as being valid, reaching a new

2    node in the current graph, and assigning the new node to be the current node;


3    if the current node type is of type test, then the step of performing a particular node type

4    operation includes performing a test on the faulty system, adding additional symptoms to the

5    current state based on the test results, traversing the edge leaving the current node to reach a new

6    node and assigning the new node to be the current node;


7    if the current node type is of type lookup, then the step of performing a particular node type

8    operation includes querying a source external to the diagnosis system and the user, adding

9    additional symptoms to the current state based on the query results, traversing the edge leaving

10   the current node to reach a new node and assigning the new node to be the current node; and


11   if the current node type is of type state-transformation, then the step of performing a particular

12   node type operation includes applying a function associated with the state-transformation node to

13   the current state to modify the current state, traversing the edge leaving the current node to reach

14   a new node and assigning the new node to be the current node.


15   22. (Original) A method as recited in claim 15, wherein:


16       a node of type diagnosis is a node representing one definitive diagnosis of the fault

17       and optionally supplying an action plan to remedy the fault;


18       a node of type call-graph is a node connecting one graph to another graph, allowing

19       composition of graphs;


20       a node of type functional-branch is a node which allows a transfer of control to any

21       other node in the current graph where the new node is the computed value of a

22       function (associated with the functional-branch node) of the current state of the

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1          diagnosis session, where the current state is represented by the set of all <question,
2          answer> pairs formed from questions already answered in the current session; and

3          a node of state-transformation is a node which allows modification of the current state
4          by applying a function associated with the state-transformation node to the current
5          state to modify it.
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